WHAT IS CLAIMED IS:

1. A manufacturing method of a semiconductor device having an STI region in which a trench is formed in a semiconductor region by etching and an insulator is filled into the trench, the method comprising the steps of: preparing dichloroethylene (DCE); and subjecting an inside of the trench to halogen oxidation with the dichloroethylene, whereby an angle of a corner portion of the semiconductor region adjacent to an opening upper end portion of the trench is made rounder than the angle before the halogen oxidation.

2. The manufacturing method of the semiconductor device according to claim 1, wherein an insulating film, which gradually becomes thinner from the opening upper end portion of the trench to a bottom portion of the trench, is formed in the trench by the halogen oxidation with the dichloroethylene.

3. The manufacturing method of the semiconductor device according to claim 1 or 2, wherein a concentration of the dichloroethylene in an oxygen environment is within a range of 0.45% to 1.97% by weight.

4. The manufacturing method of the semiconductor device according to any one of claims 1 to 3, comprising the step of filling the insulator into the trench after the halogen oxidation.

5. An oxidation method of a semiconductor substrate having an STI region in which a trench is formed in a semiconductor region by etching and an insulator is filled into the trench, the method comprising the steps of: preparing dichloroethylene (DCE); and subjecting an inside of the trench to halogen oxidation with the dichloroethylene, whereby a thickness of an oxide film at a corner portion of the semiconductor region adjacent to an opening upper end

portion of the trench is made greater than a thickness of the other oxide film in the trench.

6. The oxidation method of the semiconductor substrate according to claim 5, comprising the step of: using nitrogen as a carrier gas, bubbling with the nitrogen to vaporize the dichloroethylene, and introducing, together with oxygen, the dichloroethylene into a furnace containing a semiconductor substrate in which the trench is formed, wherein a content of the dichloroethylene in an oxygen environment in the furnace is decided by a weight percent between a weight of oxygen introduced into the furnace and the DCE introduced into the furnace by the bubbling.

7. The manufacturing method of the semiconductor substrate according to claim 6, wherein the weight percent indicating a proportion of a flow rate of the oxygen to a flow rate of the nitrogen is within a range of 0.45% to 1.97%.